

**NEW SPECIES OF BANDAKIA, WETTINA, AND ATHIENEMANNIA
FROM MICHIGAN**(ACARINA: HYDRACARINA)¹DAVID R. COOK, *Wayne State University, Detroit*

During the summer of 1959 the author began a study² on the psammophilic water mites of Michigan. In addition to collections from sand and gravel deposits of streams, routine samplings were also made in associated surface waters. Collections from surface waters of springs and streams in Barry and Alger Counties, in the Lower and Upper Peninsulas of Michigan respectively, contained the following three species.

Holotypes and allotypes will be deposited in the Chicago Natural History Museum; paratypes in the U.S. National Museum, Washington D. C.

***Bandakia vietsi*, new species**

(Figs. 1, 2, 3, 4, 6, 7)

Male.—Length of ventral shield 436μ , width 384μ ; ventral shield oval, with numerous, small pores; first coxae touching medially but with a distinct suture line; second coxae separated medially; capitular bay relatively wide and shallow; median margins of third coxae rounded and almost touching; fourth coxae separated by the genital bay; lateral margins of fourth coxae indistinct; genital field with two genital flaps covering three pairs of acetabula; over one-half of genital field lying posterior to genital bay; length of genital field 114μ , width 102μ ; a few setae located along medial and lateral edges of genital flaps; genital acetabula relatively short and wide, not taking up most of space along median margins of genital flaps (fig. 3); length of the individual acetabula 22μ - 24μ , width 16μ - 17μ ; dorsum with a large, oval dorsal shield 419μ in length, 314μ in width; with four pairs of small, plate-like glandularia in the integument posterolateral to the dorsal shield (fig. 2).

Dorsal lengths of the palpal segments: P-I, 22μ ; P-II, 78μ ; P-III, 28μ ; P-IV, 38μ ; P-V, 28μ ; length of seta on ventral side of P-II 27μ - 30μ ; anteroventral portion of P-II with a bluntly-pointed, distally-directed projection; P-IV with a ventral projection; dorsal lengths of the distal segments of the first leg: I-Leg-4, 64μ ; I-Leg-5, 71μ ; I-Leg-6, 106μ ; dorsal lengths of the distal segments of the fourth leg: IV-Leg-4, 78μ ; IV-Leg-5, 86μ ; IV-Leg-6, 88μ ; IV-Leg-6 with two ventral setae and claws at the tip (fig. 6).

Female.—Length of ventral shield 506μ , width 445μ ; ventral shield oval, with numerous pores as in male; first coxae touching medially but with a distinct suture; second coxae separated; capitular bay relatively wide and shallow; median margin of third coxae rounded, much narrower than in male and slightly

¹Contribution No. 53 from the Department of Biology, Wayne State University.

²Supported by a Research Fellowship and a Grant-in-aid from the Graduate Division, Wayne State University.

separated (fig. 1); fourth coxae separated by genital bay; lateral margins of fourth coxae indistinct; genital field with two genital flaps covering three pairs of acetabula; well over one-half of genital field projecting posterior to genital bay; genital field proportionally, as well as actually, longer than in male, length 170μ , width 128μ ; a few setae located on lateral and median margins of genital flaps; length of individual genital acetabula 28μ - 32μ , width 17μ - 19μ ; genital acetabula taking up only a relatively small amount of space along the median margins of the genital flaps; dorsum with a dorsal shield and smaller plate-like glandularia as in male, length of dorsal shield 497μ , width 384μ .

Dorsal lengths of the palpal segments: P-I, 22μ ; P-II, 82μ ; P-III, 26μ ; P-IV, 44μ ; P-V, 34μ ; length of seta on ventral side of P-II 34μ ; anteroventral portion of P-II with a bluntly-pointed, anteriorly-directed projection (fig. 4); ventral side of P-IV with a well developed, seta-bearing projection; dorsal lengths of the distal segments of the first leg: I-Leg-4, 68μ ; I-Leg-5, 73μ ; I-Leg-6, 96μ ; figure 7 illustrates the chaetotaxy of these segments.

Types: Holotype, adult male, collected in the Miner River above Miner's Falls, Alger County, Michigan (T47N/R18W/S15), August 27, 1959; allotype, adult female, taken in Glass Creek, Barry County, Michigan (T2N/R9W/S7), June 18, 1959.

Bandakia victsi is the first representative of its genus (and the family Mameropsidae) reported from the New World. *B. victsi* is most closely related to the European *B. concreta* Thor and its subspecies but differs as follows: The genital acetabula of *victsi* are shorter and broader and take up much less of the area along the median edge of the genital flaps, especially in the female. There is a bluntly-pointed, anteriorly-directed projection on the ventral side of P-II anterior to the ventral seta in *B. victsi*, the comparable structure in *concreta* is a rounded, ventrally-pointing hump. The new species may be separated from *B. orientalis*, described by Viets (1935) from Java, in that the latter has much larger plate-like glandularia flanking the posterolateral edges of the dorsal shield and lacks a ventral projection on P-IV. Two species of *Bandakia* have been described from the subterranean waters of Europe, *B. speciosa* from Germany by Viets (1953) and *B. corsica* from Corsica by Angelier (1951). These latter two species are closely related and differ from *B. victsi* as follows: The subterranean species are proportionally much longer and the plate-like glandularia associated with the dorsal shield are smaller. Also the palps of *speciosa* and *corsica* lack the seta and projection on the ventral side of P-II and do not have a projection of the ventral side of P-IV.

Wettina octopora, new species

(Figs. 5, 8, 14, 16)

Male.—Length between anterior end of first coxae and posterior end of the genital field 384μ ; anterior end of first coxae rounded, projecting well beyond capitulum; first coxae separated medially; anterior end of second coxae somewhat

rounded; apodemes from first coxae long; both first and second coxae directed more or less posteriorly; median margin of third coxae wide; median margin of fourth coxae reduced to a median angle; genital field somewhat heart-shaped, narrower anteriorly; width of genital field 128μ ; genital opening large, four genital acetabula on each side (fig. 8); edges of genital field appearing irregular due to associated secondary sclerotization; dorsum soft, with a pair of small, elongate plates located slightly posterior and lateral to the postocularia (setae without associated glands); antennaform setae at anterior end very long.

Dorsal lengths of the palpal segments: P-I, 26μ ; P-II, 60μ ; P-III, 40μ ; P-IV, 73μ ; P-V, 32μ ; structure and chaetotaxy of palp similar to that of female; dorsal lengths of the segments of the first leg: I-Leg-1, 48μ ; I-Leg-2, 36μ ; I-Leg-3, 41μ ; I-Leg-4, 54μ ; I-Leg-5, 56μ ; I-Leg-6, 84μ ; figure 5 illustrates the chaetotaxy of the first leg; other legs with long, thin setae, some of which can be classified as swimming hairs; II-Leg-5 with 5-7 swimming hairs; III-Leg-5 with 6 swimming hairs; IV-Leg-5 with 3 swimming hairs.

Female.—Length between anterior end of the first coxae and posterior end of the genital field 428μ - 454μ ; coxae of female resembling those of male except that they average slightly larger; acetabular plates somewhat triangular in shape and lying considerably posterior to the enlarged pregenital sclerite (fig. 16); each acetabular plate bears four acetabula; dorsum similar to that of male.

Dorsal lengths of the palpal segments: P-I, 29μ - 30μ ; P-II, 68μ - 70μ ; P-III, 49μ - 50μ ; P-IV, 82μ - 84μ ; P-V, 36μ - 37μ ; figure 14 illustrates the chaetotaxy of the palp; dorsal lengths of the segments of the first leg: I-Leg-1, 56μ - 57μ ; I-Leg-2, 40μ - 42μ ; I-Leg-3, 46μ - 49μ ; I-Leg-4, 60μ - 64μ ; I-Leg-5, 58μ - 60μ ; I-Leg-6, 92μ - 96μ ; chaetotaxy of first leg similar to that of male; II-Leg-5 with 5-7 swimming hairs; III-Leg-5 with 5-6 swimming hairs; IV-Leg-5 with 1-4 swimming hairs.

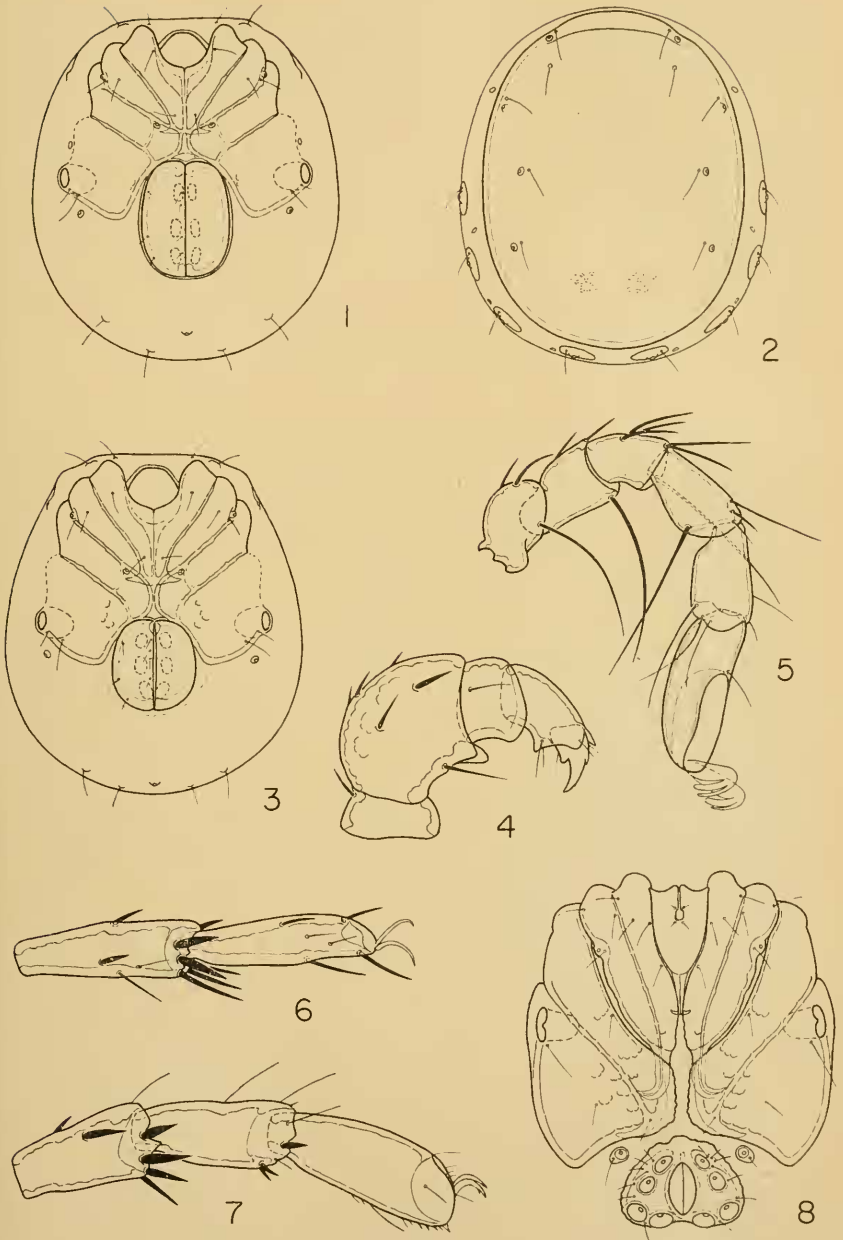
Types: Holotype, adult male, taken in Power's Creek (actually a large reocrene spring), Barry County, Michigan (T4N/R9W/S32), September 26, 1959; allotype, adult female, same data as holotype; one paratype female, collected in the headwaters of a small stream leaving the Yankee Springs, Barry County, Michigan (T3N/R10W/S26), June 18, 1959.

Both localities in which this species was collected are the headwaters of very cold streams fed by extensive areas of springs. The new species is closely related to the holarctic species, *W. podagrica* (Koch), the most obvious difference being the possession of four pairs of genital acetabula by *W. octopora* rather than three. In addition, *W. podagrica* is larger and the acetabular plates, especially in the male, are proportionally, as well as actually, larger.

Wettina octopora is the second known member of the subfamily Tiphysinae in which there are more than the characteristic three pairs

Bandakia victsi, n.sp. Fig. 1, ventral view, female; fig. 2, dorsal view, male; fig. 3, ventral view, male; fig. 4, palp, female; fig. 6, distal segments of fourth leg, male; fig. 7, distal segments of first leg, female.

Wettina octopora, n.sp. Fig. 5, first leg, male; fig. 8, ventral view, male.



of genital acetabula. In *Tiphys mitchelli*, described by Cook (1956), the number of acetabula varied from four to six on each side. There has been a tendency in water mite classification to use number of acetabula as a criterion for the establishment of subgenera. On this basis, a new subgenus would need to be erected to receive *W. octopora*. However, for reasons given in the "remarks" section under *Tiphys mitchelli* Cook 1956, the author feels that a small change in acetabula numbers (for example, three pairs to four pairs) is not sufficient, in the absence of other differences, to warrant the establishment of a separate subgenus. Because the differences between *octopora* and *podagrica* are very small, except that of the acetabula number, the erection of a new subgenus does not seem to be justified.

Athienemannia schermeri besselingi, new subspecies

(Figs. 9, 10, 11, 12, 13, 15)

Male.—Length of ventral shield 558μ - 672μ , width 523μ - 576μ ; ventral shield oval, with numerous pores; median margins of first, third and fourth coxae well developed, second coxae not touching medially; a pair of glandularia located at posterior edge of fourth coxae; genital field oval in outline, longer than wide, with 36-41 acetabula on each side; acetabula lying free in the integument of the genital opening; width of acetabular region 66μ - 72μ ; four pairs of setae flanking the acetabular region (fig. 12); dorsum with large dorsal shield 541μ - 620μ in length, 488μ - 541μ in width.

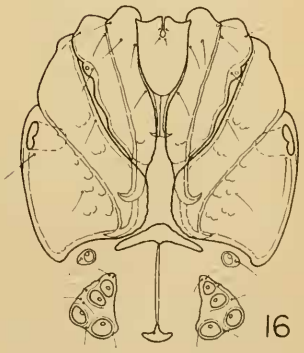
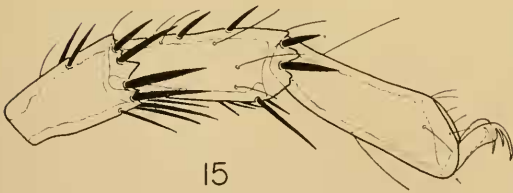
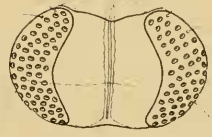
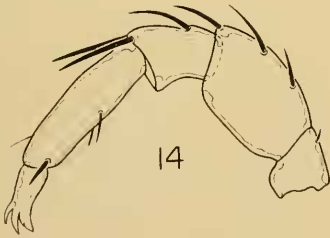
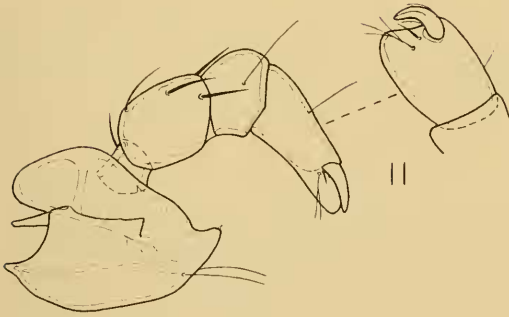
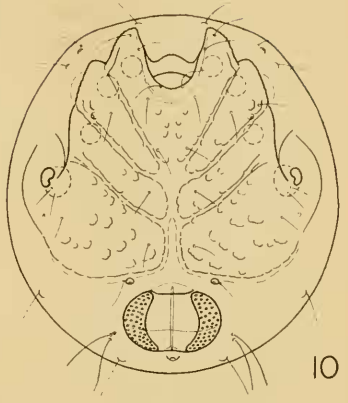
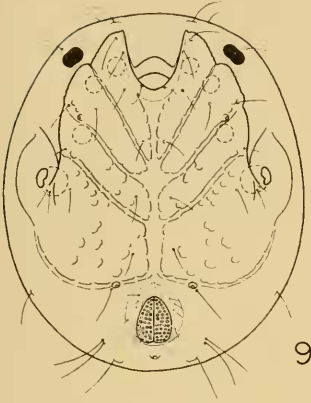
Dorsal lengths of the palpal segments: P-I, 24μ - 30μ ; P-II, 64μ - 72μ ; P-III, 40μ - 47μ ; P-IV, 72μ - 76μ ; P-V, 32μ - 35μ ; P-IV with a short heavy seta and a long, thin, 2-3 branched seta near insertion of P-V; structure and chaetotaxy of palp similar to that of female; dorsal lengths of distal segments of first leg: I-Leg-4, 66μ - 72μ ; I-Leg-5, 84μ - 98μ ; I-Leg-6, 100μ - 120μ .

Female.—Length of ventral shield 690μ - 786μ , width 646μ - 715μ ; ventral shield oval, coxae similar to those of male (fig. 10); genital field oval, wider than long; with 48-59 acetabula on each side, these located on acetabular plates (fig. 13); dorsum with a large dorsal shield 663μ - 750μ in length, 567μ - 628μ in width.

Dorsal lengths of the palpal segments: P-I, 34μ - 40μ ; P-II, 76μ - 82μ ; P-III, 50μ - 56μ ; P-IV, 86μ - 96μ ; P-V, 37μ - 40μ ; P-IV with a short, heavy seta and a long, thin, 2-3 branched seta near insertion of P-V (fig. 11); P-IV wider than thick, and oriented at right angles to the long axis of the body; in figure 11 the small figure at right shows P-IV and P-V shifted approximately 90° to that on the left; tip of capitulum drawn out into a small, slightly upturned rostrum (fig. 11); dorsal lengths and greatest height of distal segments of first leg (height given in parentheses following length measurement): I-Leg-4, 72μ - 76μ (40μ - 44μ); I-Leg-5, 96μ - 104μ (36μ - 40μ); I-Leg-6, 112μ - 122μ (34μ - 36μ); figure 15 illustrates the distal segments of the first leg.

Athienemannia schermeri besselingi, n.sp. Fig. 9, ventral view, male; fig. 10, ventral view, female; fig. 11, palp and capitulum, female; fig. 12, genital field, male; fig. 13, genital field, female; fig. 15, distal segments of first leg, female.

Wettina octopora, n.sp. Fig. 14, palp, male; fig. 16, ventral view, female.



Types: Holotype, adult male, collected in the Yankee Springs, Barry County, Michigan (T3N/R10W/S35), July 19, 1959; allotype, adult female, same data; paratypes, 1 male, 10 females, same area, between June 18 and July 28, 1959; 1 male, taken in a small spring near Hastings, Barry County, Michigan (T3N/R9W/S24), July 28, 1959; 1 male, collected in Power's Creek (a large reocrene spring), Barry County, Michigan (T4N/R9W/S32), September 26, 1959.

Athienemannia schermeri besselingi is the second species of its genus reported from North America. *A. brunsoni*, described by Cook (1955) from Montana, differs from *besselingi* in being larger, possessing proportionally longer legs, and III-Leg-5 of the male exhibiting a slight sexual dimorphism. The mites from Michigan are closely related to the European subspecies, *A. schermeri schermeri* described by Viets (1920) from Germany. *Athienemannia schermeri besselingi*, with a length varying from 690 μ -786 μ in the female, is somewhat larger than the European subspecies. Viets (1923) reports a variation in body length of 615 μ -685 μ . Also, the leg segments of *besselingi* are noticeably longer and thinner than in *schermeri*. Besseling (1951) described what appeared to be a second European species of *Athienemannia*, *A. fluvicola*, but Kurt O. Viets (1960) has shown it to be the female of *Mundamella germanica* Viets.

REFERENCES

- Angelier, E., 1951. Diagnoses sommaires d'Hydracariens psammiques nouveaux de Corse. Bull. Mus. Nat. Hist. nat., 23: 508-510.
- Besseling, A. J., 1951. Nederlandse Hydrachnellae XXX, *A-Thienemannia fluvicola* n. sp. Ent. Berichten, 13: 315-316.
- Cook, David R., 1955. A new species of *Athienemannia* from Western North America. Proc. Ent. Soc. Washington, 57: 306-308.
- , 1956. Preliminary studies on the Tiphysinae of the United States. Ann. Ent. Soc. Amer., 49: 236-274.
- Viets, Karl, 1920. Hydracarinae aus nord-deutschen und schwedischen Quellen. Arch. Hydrobiol. 12: 803-814.
- , 1923. Hydracarinae aus Quellen. *Ibid.*, Suppl. Band 3: 156-384.
- , 1935. Die Wassermilben von Sumatra, Java und Bali nach den Deutschen Limnologischen Sunda-Expedition. *Ibid.* Suppl. Band 13: 484-738.
- , 1953. Eine neue *Bandakia*-Art. Zool. Anz. 150: 67-69.
- , 1956. Die Milben des Susswassers und des Meeres. Gustav Fischer Verlag, Jena, pp. 1-870.
- Viets, Kurt O., 1960. *Mundamella germanica* Viets 1913, *syn.*: *A-Thienemannia fluvicola* Besseling 1951 (Hydrachnellae, Aeri) Zool. Anz., 164: 155-159.